

# CONTINENTAL SHELF RESEARCH

VOLUME 16, 1996

## VOLUME CONTENTS AND AUTHOR INDEX

### *Editors*

PROFESSOR MICHAEL COLLINS: *Southampton Oceanography Centre, European Way,  
Empress Docks, Southampton SO14 3ZH, U.K.*  
*e-mail: shelfres@soc.soton.ac.uk*

PROFESSOR RICHARD W. STERNBERG: *University of Washington, School of Oceanography,  
Box 357940, Seattle, WA 98195-7940, U.S.A.*  
*e-mail: csr@ocean.washington.edu*



PERGAMON

# CONTINENTAL SHELF RESEARCH

## Editors

PROFESSOR MICHAEL COLLINS: *Southampton Oceanography Centre, European Way,  
Empress Docks, Southampton SO14 3ZH, U.K.*  
e-mail: shelfres@soc.soton.ac.uk

PROFESSOR RICHARD W. STERNBERG: *University of Washington, School of Oceanography,  
Box 357940, Seattle, WA 98195-7940, U.S.A.*  
e-mail: csr@ocean.washington.edu

## Associate Editors

D. CACCHIONE — MENLO PARK, CA, U.S.A. J. McMANUS — ST ANDREWS, U.K.  
A. D. HEATHERSHAW — PORTLAND, U.K. T. HOPKINS — RALEIGH, NC, U.S.A.

## Editorial Advisory Board

J. AIKEN — PLYMOUTH, U.K.  
R. C. ALLER — STONY BROOK, NY, U.S.A.  
F. T. BANNER — LONDON, U.K.  
R. CHESTER — LIVERPOOL, U.K.  
M. DAGG — CHAUVIN, LA, U.S.A.  
A. M. DAVIES — BIRKENHEAD, U.K.  
R. DEIGAARD — LYNGBY, DENMARK  
D. DRAKE — MENLO PARK, CA, U.S.A.  
J. E. ECKMAN — SAVANNAH, GA, U.S.A.  
G. EVANS — JERSEY, U.K.  
J. S. GRAY — OSLO, NORWAY  
B. O. JANSSON — STOCKHOLM, SWEDEN  
C. LATOUCHE — TALLAHASSEE, FL, U.S.A.  
O. MADSEN — CAMBRIDGE, MA, U.S.A.

I. McCAYE — CAMBRIDGE, U.K.  
H. O. MOFJELD — SEATTLE, WA, U.S.A.  
C. A. NITTROUER — STONY BROOK, NY,  
U.S.A.  
J. J. O'BRIEN — TALLAHASSEE, FL, U.S.A.  
A. H. SALLENGER — ST PETERSBURG,  
FL, U.S.A.  
J. F. A. SLEATH — CAMBRIDGE, U.K.  
P. A. TYLER — SOUTHAMPTON, U.K.  
E. WOLANSKI — TOWNSVILLE, AUSTRALIA  
L. D. WRIGHT — GLOUCESTER POINT, VA,  
U.S.A.  
J. T. F. ZIMMERMAN — TEXEL,  
THE NETHERLANDS

## Production Editor

MARGARET DENLEY — ELSEVIER SCIENCE LTD, U.K.  
Tel: (+1865) 843184; Fax: (+1865) 843969; e-mail: m.denley@elsevier.co.uk

## Publishing and Advertising Offices

Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K.  
Tel: (+1865) 843000; Fax: (+1865) 843010.

Published monthly plus additional issues in April, August and December.

## Subscription Information

Annual Institutional Subscription Rates 1997: Europe, The CIS and Japan 1882 Dutch Guilders. All other countries U.S.\$1162. Associated Personal Subscription Rates are available on request for those whose institutions are library subscribers. Dutch Guilders prices exclude VAT. Non-VAT registered customers in the European Community will be charged the appropriate VAT in addition to the price listed. Prices include postage and insurance and are subject to change without notice. Any enquiry relating to subscriptions should be sent to:

**The Americas:** Elsevier Science Customer Support Department, P.O. Box 945, New York, NY 10010, U.S.A.  
[Tel: (+1) 212-633-3730/1-888 4ES-INFO; Fax: (+1) 212-633-3680; e-mail: usinfo-f@elsevier.com].

**Japan:** Elsevier Science Customer Support Department, 9-15 Higashi-Azabu 1-chome, Minato-ku, Tokyo 106, Japan  
[Tel: (+3) 5561-5033; Fax: (+3) 5561-5047; e-mail: kyf04035@niftyserve.or.jp].

**Asia Pacific (excluding Japan):** Elsevier Science (Singapore) Pte Ltd, No. 1 Millenia Tower, Singapore 039192 [Tel: (+65) 434-3727; Fax: (+65) 337-2230; e-mail: asiainfo@elsevier.com.sg].

**Rest of the World:** Elsevier Science Customer Service Department, P.O. Box 211, 1001 AE Amsterdam, The Netherlands [Tel: (+31) 20-485-3757; Fax: (+31) 20-485-3432; e-mail: nlinfo-f@elsevier.nl].

**Back Issues:** Back issues of all previously published volumes are available direct from Elsevier Science Offices (Oxford and New York). Complete volumes and single issues can be purchased for 1990-1996. Earlier issues are available in high quality photo-duplicated copies as complete volumes only. Back volumes on microfilm are available from UMI, 300 North Zeeb Road, Ann Arbor, MI 48106, U.S.A.

Copyright © 1996 Elsevier Science Ltd. All rights reserved.

PERIODICALS POSTAGE PAID AT NEWARK, NEW JERSEY. *Continental Shelf Research* (ISSN 0278-4343) is published monthly plus additional issues in April, August and December by Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K. The annual subscription in the U.S.A. is \$1162. *Continental Shelf Research* is distributed by Mercury Airfreight International Ltd, 10 Camptown Road, Irvington, New Jersey 07111-1105. POSTMASTER: Please send address corrections to *Continental Shelf Research*, c/o Elsevier Science, RSO, Customer Support Department, 655 Avenue of the Americas, New York, NY 10010, U.S.A.  
[Tel: (+1) 212-633-3730/1-888 4ES-INFO; Fax: (+1) 212-633-3680; e-mail: usinfo-f@elsevier.com].

## Contents of Volume 16

### January

Publisher's Note	i
J. J. BISAGNI, D. J. GIFFORD and C. M. RUHSAM	1 The spatial and temporal distribution of the Maine Coastal Current during 1982
A. M. DAVIES and J. E. JONES	25 The influence of wind and wind wave turbu- lence upon tidal currents: Taylor's problem in three dimensions with wind forcing
P. J. LUYTEN, E. DELEERSNIJDER, J. OZER and K. G. RUDDICK	101 Presentation of a family of turbulence closure models for stratified shallow water flows and preliminary application to the Rhine outflow region
<i>Current Awareness</i>	B1
List of Forthcoming Papers for <i>Continental Shelf Research</i>	I
List of Contents for <i>Deep-Sea Research I</i> , Vol. 42, No. 5	II

### February

T. POHLMANN	131 Predicting the thermocline in a circulation model of the North Sea—Part I: model de- scription, calibration and verification
T. POHLMANN	147 Calculating the annual cycle of the vertical eddy viscosity in the North Sea with a three- dimensional baroclinic shelf sea circulation model
T. POHLMANN	163 Calculating the development of the thermal vertical stratification in the North Sea with a three-dimensional baroclinic circulation model
T. POHLMANN	195 Simulating the heat storage in the North Sea with a three-dimensional circulation model
C. PROVOST, V. GARÇON and L. M. FALCON	215 Hydrographic conditions in the surface layers over the slope-open ocean transition area near the Brazil-Malvinas Confluence during austral summer 1990
D. PRANDLE, G. BALLARD, D. FLATT, A. J. HARRISON, S. E. JONES, P. J. KNIGHT, S. LOCH, J. McMANUS, R. PLAYER and A. TAPPIN	237 Combining modelling and monitoring to determine fluxes of water, dissolved and particulate metals through the Dover Strait
<i>Book Review</i>	259
<i>Erratum</i>	261
<i>Current Awareness</i>	B9

List of Forthcoming Papers for Continental Shelf Research I

List of Contents for *Deep-Sea Research I*, Vol. 42, Nos 6 and 7 II

### March

- |   |     |  |
|---|-----|--|
| D. J. DEMASTER and R. H. POPE                                     | 263 | Nutrient dynamics in Amazon shelf waters: results from AMASSEDs  |
| W. O. SMITH JR and D. J. DEMASTER                                 | 291 | Phytoplankton biomass and productivity in the Amazon River plume: correlation with seasonal river discharge                                  |
| O. S. CHAUHAN and A. R. GUJAR                                     | 321 | Surficial clay mineral distribution on the southwestern continental margin of India: evidence of input from the Bay of Bengal                |
| O. O. MOLLER JR, J. A. LORENZZENTI, J. L. STECH and M. M. MATA    | 335 | The Patos Lagoon summertime circulation and dynamics   |
| M. BASKARAN, P. H. SANTSCHI, L. GUO, T. S. BIANCHI and C. LAMBERT | 353 | <sup>234</sup> Th, <sup>238</sup> U disequilibria in the Gulf of Mexico: the importance of organic matter and particle concentration         |
| M. FRANKIGNOULLE, I. BOURGE, C. CANON and P. DAUBY                | 381 | Distribution of surface seawater partial CO <sub>2</sub> pressure in the English Channel and in the Southern Bight of the North Sea          |
| S. B. MORAN, P. A. YEATS and P. W. BALLS                          | 397 | On the role of colloids in trace metal solid-solution partitioning in continental shelf waters: a comparison of model results and field data |
| <i>Current Awareness</i>  | B21 |  |
| List of Forthcoming Papers for Continental Shelf Research         | I   |  |

### April

- |   |     |   |
|---|-----|---|
| R. F. CHEN, B. FRY, C. S. HOPKINSON, D. J. REPETA and E. T. PELTZER | 409 | Dissolved organic carbon on Georges Bank  |
| R. FREIMANN   | 421 | <i>In situ</i> measurement of the zooplankton volume-frequency distribution by means of light scattering    |
| J. I. DÍAZ, A. PALANQUES, C. HANS NELSON and J. GUILLÉN             | 435 | Morpho-structure and sedimentology of the Holocene Ebro prodelta mud belt (north-western Mediterranean Sea) |
| P. V. HAREESH KUMAR and N. MOHAN KUMAR                              | 457 | On the flow and thermohaline structure off Cochin during pre-monsoon season                                 |
| R. H. TYLER and B. G. SANDERSON                                     | 469 | Wind-driven pressure and flow around an island  |
| J. P. CHRISTENSEN, D. W. TOWNSEND and J. P. MONTOYA                 | 489 | Water column nutrients and sedimentary denitrification in the Gulf of Maine                                 |
| JIUXING XING and A. M. DAVIES                                       | 517 | Application of a range of turbulence energy models to the determination of $M_4$ tidal current profiles     |

<i>Book Review</i>	549
<i>Current Awareness</i>	B35
List of Forthcoming Papers for <i>Continental Shelf Research</i>	I
List of Contents for <i>Deep-Sea Research I</i> , Vol. 42, No. 8	II

#### April/May

<i>Preface</i>	551
C. A. NITTROUER and D. J. DEMASTER	553 The Amazon shelf setting: tropical, energetic, and influenced by a large river
W. R. GEYER, R. C. BEARDSLEY, S. J. LENTZ, J. CANDELA, R. LIMEBURNER, W. E. JOHNS, B. M. CASTRO and I. D. SOARES	575 Physical oceanography of the Amazon shelf
D. J. DEMASTER, W. O. SMITH JR., D. M. NELSON and J. Y. ALLER	617 Biogeochemical processes in Amazon shelf waters: chemical distributions and uptake rates of silicon, carbon and nitrogen
W. S. MOORE, D. J. DEMASTER, J. M. SMOAK, B. A. MCKEE and P. W. SWARZENSKI	645 Radionuclide tracers of sediment-water interactions on the Amazon shelf
G. C. KINEKE, R. W. STERNBERG, J. H. TROWBRIDGE and W. R. GEYER	667 Fluid-mud processes on the Amazon continental shelf
R. W. STERNBERG, D. A. CACCHIONE, B. PAULSON, G. C. KINEKE and D. E. DRAKE	697 Observations of sediment transport on the Amazon subaqueous delta
J. Y. ALLER and I. STUPAKOFF	717 The distribution and seasonal characteristics of benthic communities on the Amazon shelf as indicators of physical processes
R. C. ALLER, N. E. BLAIR, Q. XIA and P. D. RUDE	753 Remineralization rates, recycling, and storage of carbon in Amazon shelf sediments
S. A. KUEHL, C. A. NITTROUER, M. A. ALLISON, L. E. C. FARIA, D. A. DUKAT, J. M. JAEGER, T. D. PACIONI, A. G. FIGUEIREDO and E. C. UNDERKOFFLER	787 Sediment deposition, accumulation, and sea- bed dynamics in an energetic fine-grained coastal environment
C. A. NITTROUER, S. A. KUEHL, A. G. FIGUEIREDO, M. A. ALLISON, C. K. SOMMERFIELD, J. M. RINE, L. E. C. FARIA and O. M. SILVEIRA	817 The geological record preserved by Amazon shelf sedimentation

<i>Current Awareness</i>	B43
List of Forthcoming Papers for <i>Continental Shelf Research</i>	I

#### June

P. M. STEGMANN and J. A. YODER	843 Variability of sea-surface temperature in the South Atlantic Bight as observed from satel- lite: implications for offshore-spawning fish
--------------------------------	--

K. K. TUREKIAN, N. TANAKA,  
V. C. TUREKIAN, T. TORGERSEN and  
E. C. DEANGELO

D. R. LYNCH, J. T. C. IP,  
C. E. NAIMIE and F. E. WERNER

A. J. VAN DEN BERG,  
H. RIDDERINKHOF, R. RIEGMAN,  
P. RUARDIJ and H. LENHART

T. P. RIPPETH and J. H. SIMPSON

A. J. SOUZA and I. D. JAMES

G. E. MILLWARD, J. I. ALLEN,  
A. W. MORRIS and A. TURNER

*Corrigendum*

*Current Awareness*

List of Forthcoming Papers for  
*Continental Shelf Research*

863 Transfer rates of dissolved tracers through  
estuaries based on  $^{228}\text{Ra}$ : a study of Long  
Island Sound

875 Comprehensive coastal circulation model  
with application to the Gulf of Maine

907 Influence of variability in water transport  
on phytoplankton biomass and composition  
in the southern North Sea: a modelling  
approach (FYFY)

933 The frequency and duration of episodes of  
complete vertical mixing in the Clyde Sea

949 A two-dimensional ( $x$ - $z$ ) model of tidal  
straining in the Rhine ROFI

967 Distributions and fluxes of non-detrital par-  
ticulate Fe, Mn, Cu, Zn in the Humber  
coastal zone, U.K.

995

B53

I

## July

A. J. SOUZA and J. H. SIMPSON

997 The modification of tidal ellipses by stratifi-  
cation in the Rhine ROFI

T. M. SANDERS and R. W. GARVINE

1009 Frontal observations of the Delaware  
Coastal Current source region

JING ZHANG

1023 Nutrient elements in large Chinese estuaries

M. PEJRUP, J. VALEUR and A. JENSEN

1047 Vertical fluxes of particulate matter in  
Aarhus Bight, Denmark

P. S. GILBERT, T. N. LEE and  
G. P. PODESTÀ

1065 Transport of anomalous low-salinity waters  
from the Mississippi River flood of 1993 to  
the Straits of Florida

P. G. VERITY, G.-A. PAFFENHÖFER,  
D. WALLACE, E. SHERR and B. SHERR

1087 Composition and biomass of plankton in  
spring on the Cape Hatteras shelf, with  
implications for carbon flux

E. MARONE

1117 "Radiational tides" as nonlinear effects:  
bispectral interpretation

*Current Awareness*

B63

List of Forthcoming Papers for  
*Continental Shelf Research*

I

List of Contents for *Deep-Sea Research I*,  
Vol. 42, Nos 9 and 10

## August

M. J. FURNAS and A. W. MITCHELL

1127 Nutrient inputs into the central Great Barrier  
Reef (Australia) from subsurface intrusions  
of Coral Sea waters: a two-dimensional  
displacement model

Y. ISODA	1149	Interaction of a warm eddy with the coastal current at the eastern boundary area in the Tsushima Current region
J. P. RYAN and J. A. YODER	1165	Long-term mean and event-related pigment distributions during the unstratified period in South Atlantic Bight outer margin and middle shelf waters
E. FOGELQVIST, T. TANHUA, Ö. BASTÜRK and I. SALIHOGLU	1185	The distribution of man-made and naturally produced halocarbons in a double layer flow strait system
F. GILBES, C. TOMAS, J. J. WALSH and F. E. MÜLLER-KARGER	1201	An episodic chlorophyll plume on the West Florida Shelf
K. E. OSGOOD and B. W. FROST	1225	Effects of advection on the seasonal abundance patterns of three species of planktonic calanoid copepods in Dabob Bay, Washington
G. BROSTRÖM and J. RODHE	1245	Velocity shear and vertical mixing in the Ekman layer in the presence of a horizontal density gradient
<i>Current Awareness</i>	B79	
List of Forthcoming Papers for <i>Continental Shelf Research</i>	I	
<b>August</b>		
M. B. FRAMIÑAN and O. B. BROWN	1259	Study of the Rio de la Plata turbidity front, Part I: spatial and temporal distribution
A. L. RIVAS and A. F. LANGER	1283	Mass and heat transport in the Argentine Continental Shelf
R. K. REED and P. J. STABENO	1297	On the climatological mean circulation over the eastern Bering Sea shelf
I. D. LIMA, C. A. E. GARCIA and O. O. MÖLLER	1307	Ocean surface processes on the southern Brazilian shelf: characterization and seasonal variability
T. YANAGI, K. TADOKORO and T. SAINO	1319	Observation of convergence, divergence and sinking velocity at a thermohaline front in the Kii Channel, Japan
N. K. HØJERSLEV, N. HOLT and T. AARUP	1329	Optical measurements in the North Sea-Baltic Sea transition zone. I. On the origin of the deep water in the Kattegat
T. AARUP, N. HOLT and N. K. HØJERSLEV	1343	Optical measurements in the North Sea-Baltic Sea transition zone. II. Water mass classification along the Jutland west coast from salinity and spectral irradiance measurements
T. AARUP, N. HOLT and N. K. HØJERSLEV	1355	Optical measurements in the North Sea-Baltic Sea transition zone. III. Statistical analysis of bio-optical data from the Eastern North Sea, the Skagerrak and the Kattegat
S.-Y. CHAO, W. C. BOICOURT and H. V. C. WANG	1379	Three-layered circulation in reverse estuaries



Current Awareness B89

List of Forthcoming Papers for Continental Shelf Research I

List of Contents for *Deep-Sea Research I*, Vol. 42, No. 11/12 II

### September

H. YÜCE 1399 On the variability of Mediterranean water flow into the Black Sea

W. VAN RAAPHORST and J. F. P. MALSCHAERT 1415 Ammonium adsorption in superficial North Sea sediments

E. WOLANSKI, T. ASAEDA, A. TANAKA and E. DELEERSNIJDER 1437 Three-dimensional island wakes in the field, laboratory experiments and numerical models

B. NG, L. A. NASH and S. R. BOXALL 1453 Eigenfunctions in the Galerkin method of tidal current modelling

M. SAMUELSSON 1463 Interannual salinity variations in the Baltic Sea during the period 1954–1990

O. HOLBY and L. G. ANDERSON 1479 Geochemistry in an area recently uncovered from the Filchner Ice Shelf

A. LANE and D. PRANDLE 1489 Inter-annual variability in the temperature of the North Sea

Current Awareness B101

List of Forthcoming Papers for Continental Shelf Research I

List of Contents for *Deep-Sea Research I*, Vol. 43, No. 1 II

### October

C. V. K. PRASADA RAO and M. BABA 1509 Observed wave characteristics during growth and decay: a case study

S. A. R. SULTAN and N. M. ELGHRIBI 1521 Temperature inversion in the Arabian Gulf and the Gulf of Oman

T. TORGENSEN, K. K. TUREKIAN, V. C. TUREKIAN, N. TANAKA, E. DEANGELO and J. O'DONNELL 1545 <sup>224</sup>Ra distribution in surface and deep water of Long Island Sound: sources and horizontal transport rates

GWO-CHING GONG, YUH-LING LEE CHEN and KON-KEE LIU 1561 Chemical hydrography and chlorophyll *a* distribution in the East China Sea in summer: implications in nutrient dynamics

B. K. PAL and G. HOLLOWAY 1591 Dynamics of circulation off the west coast of Vancouver Island

### Notes

D. D. SHEU, W. Y. LEE, C. H. WANG, C. L. WEI, C. T. A. CHEN, C. CHERNG and M. H. HUANG 1609 Depth distribution of  $\delta^{13}\text{C}$  of dissolved  $\Sigma\text{CO}_2$  in seawater off eastern Taiwan: effects of the Kuroshio current and its associated upwelling phenomenon



T. S. HOPKINS	1621	A note on the geostrophic velocity field referenced to a point
<i>Book Review</i>	1631	
<i>Announcement</i>	1633	
<i>Current Awareness</i>	B113	
List of Forthcoming Papers for <i>Continental Shelf Research</i>	I	

#### November

J. M. GUTIERREZ-MAS, F. J. HERNÁNDEZ-MOLINA and F. LÓPEZ-AGUAYO	1635	Holocene sedimentary dynamics on the Iberian continental shelf of the Gulf of Cádiz (SW Spain)
V. A. BALLANTYNE, M. G. G. FOREMAN, W. R. CRAWFORD and R. JACQUES	1655	Three-dimensional model simulations for the north coast of British Columbia
M. KAWAMIYA, M. J. KISHI, M. D. KAWSER AHMED and T. SUGIMOTO	1683	Causes and consequences of spring phytoplankton blooms in Otsuchi Bay, Japan
T. RADZIEJEWSKA, J. W. FLEEGER, N. N. RABALAIS and K. R. CARMAN	1699	Meiofauna and sediment chloroplastic pigments on the continental shelf off Louisiana, U.S.A.
A. P. BARROS	1725	An evaluation of model parameterizations of sediment pathways: a case study for the Tejo estuary
<i>Current Awareness</i>	B127	
List of Forthcoming Papers for <i>Continental Shelf Research</i>	I	
List of Contents for <i>Deep-Sea Research I</i> , Vol. 43, No. 2	II	

#### December

G. GAWARKIEWICZ, T. G. FERDELMAN, T. M. CHURCH and G. W. LUTHER III	1751	Shelfbreak frontal structure on the continental shelf north of Cape Hatteras
E. L. LEWIS, D. PONTON, L. LEGENDRE and B. LEBLANC	1775	Springtime sensible heat, nutrients and phytoplankton in the Northwater Polynya, Canadian Arctic
H. SIEGEL, M. GERTH and T. SCHMIDT	1793	Water exchange in the Pomeranian Bight investigated by satellite data and shipborne measurements
A. VALLE-LEVINSON, J. M. KLINCK and G. H. WHELESS	1819	Inflows/outflows at the transition between a coastal plain estuary and the coastal ocean
P. LESUEUR, J. P. TASTET and L. MARAMBAT	1849	Shelf mud field formation within historical times: examples from offshore the Gironde estuary, France
H. VAN HAREN	1871	Correcting false thermistor string data
<i>Current Awareness</i>	B139	
List of Forthcoming Papers for <i>Continental Shelf Research</i>	I	

O. LE PAPE, Y. DEL AMO,  
A. MENESGUEN, A. AMINOT,  
B. QUEQUINER and P. TREGUER

Z. SHI and J. Y. CHEN

A. FALQUÉS, A. MONTOTO and  
V. IRANZO

J. D. BOON, M. O. GREEN and  
K. D. SUH

R. A. BEACH and R. W. STERNBERG

R. J. UNCLES and D. H. PETERSON

*Current Awareness*

List of Forthcoming Papers for  
*Continental Shelf Research*

## December

- 1885 Resistance of a coastal ecosystem to increasing eutrophic conditions: the Bay of Brest (France), a semi-enclosed zone of Western Europe
- 1909 Morphodynamics and sediment dynamics on intertidal mudflats in China (1961–1994)
- 1927 Bed-flow instability of the longshore current
- 1965 Bimodal wave spectra in lower Chesapeake Bay, sea bed energetics and sediment transport during winter storms
- 1989 Suspended-sediment transport in the surf zone: response to breaking waves
- 2005 The long-term salinity field in San Francisco Bay

B151

I

